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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/11/2003

Mohammed Azam Hussain

MH01

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27797

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08/09/2006

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EXAMINER

FORTUNA, ANA M

ART UNIT

PAPER NUMBER

1723

DATE MAILED: 08/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	10/605,974		HUSSAIN, MOHAMMED AZAM	
	Examiner		Art Unit	
	Ana M. Fortuna		1723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 14-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 14-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The finality of the last Office action has been withdrawn in order to consider newly found prior art. The amendment filed on 4/18/06 has been entered.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 1, 2, 4, 5, 7-10, 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over S. B. Heath et al (US 2,398,743)(hereinafter Heath) in view of Somerville et al (US 4, Heath teaches a method of separating magnesium compounds and calcium salts (calcium compounds), as precipitate from sea water, the process includes the steps of adding an alkali metal hydroxide, e.g. sodium hydroxide (column 1, lines 24-55, column 2, lines 1-13), to produce a precipitate containing in addition to magnesium hydroxide, calcium salts (see column 2, last paragraph, bridging column 3, lines 1-2). Heath does not teach the exact amount of the sodium hydroxide or lime added in g/L, however, teaches the level of alkalinity required to precipitate magnesium hydroxide, e.g. 0.001N-0.03 N, which corresponds to 10 to 30 % above the level in the sea water (see column 2, lines 21-24). The level of alkalinity required to precipitate calcium in sea water is also disclosed as being between 0.04 N, to 0.065 N. (see column

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2, lines 30-34), filtration to separate a filtrate from the sludge is further performed (see column 2, last paragraph bridging column 3). Although the specific range of concentration is not disclosed in Heath, one skilled in the art at the time this invention was made would have been motivated to select suitable ranges capable of producing calcium precipitation based on the limit solubility of calcium disclosed in Heath's patent.

Heath also fails to teach the **desalination step**.

Somerville et al teach separating magnesium and calcium salts from sea water, by treating sea water with alkaline agent, which includes pretreating the water to remove magnesium, and further treating to remove calcium compounds by adjusting the water by addition of alkaline agents, separating the calcium compounds by filtration, and further removing remaining salts in the brine, e.g. desalinating, to produce purified water by evaporation, e.g vapor compression multieffect evaporator, etc (see column 2, lines 18-56, column 3, lines 21-68, column 4, lines 1-55).

The skilled in the art at the time this invention was made would have been motivated to evaporate the water resulting from the filtration step in the process of Heath, to alternatively remove remaining salts and produce purified water, as suggested by Somerville et al.

The skilled in the art can alternatively remove the calcium/magnesium salts by adjusting the alkalinity within the levels suggested in Heath, which are critical for the precipitation of magnesium and /or calcium from seawater.

Regarding claim 2, seawater is disclosed in Heath (see Figure), and '533 (abstract).

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Regarding claim 4, Flash evaporation is recognized equivalent to multi-effect evaporation and vapor compression for seawater desalination.

Regarding claim 5, filtration is discussed above (see Heath figure, element 3).

Regarding claims 7-8 pH adjustments e.g. for further salt separation, and to control corrosion problems in the evaporation step c) are suggested in Somerville et al (column 5, lines 13-35). One skilled in the art would have been motivated to select a neutral pH e.g. pH 7, for example to avoid corrosion in the evaporator, as suggested in Somerville et al.

As to claim 9, and 10, sodium hydroxide is disclosed in both references above. And the amount required for precipitating calcium and magnesium are also disclosed in Heath, discussed above. The addition to the require level of alkalinity to cause precipitation of ether magnesium or calcium compound is known by the references above.

As to claim 14 a two steps separation is suggested in Somervilled, which includes first separation of magnesium, and second separation of calcium compounds (see column 3, lines 45-68, column 4, lines 1-68 and column 5, lines 1-54).

As to claim 15, Somervilled et al teaches precipitation of magnesium hydroxide in sea water by addition of calcium hydroxide (see column 4, second paragraph), a adding it in an amount sufficient to adjust the pH of the water to a level between 7.5 to 9.0 (column 3, lines 57-65), therefore, it would have been obvious to one skilled in this art to select an adequate amount of the pH modifying agent or mixtures of alkali agents to adjust the water pH a at suitable level or concentration in the water which cause enough alkalinity

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to cause precipitation of magnesium and residual calcium from the water. Removing salts in stages is suggested in both references discussed above.

The separation of calcium or magnesium is a first step or a second step in the process of the process, knowing the PH conditions/ alkalinity level required to cause its precipitation is part of knowledge of the skilled in the art, based on the discussion above and will be an obvious alternative.

Mixing more than one alkaline compound to reach to the level of alkalinity require it would also have been obvious to one skilled in this art at the time this invention was made.

3. Claims 1-11, 14-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson (US 4,036, 749). Anderson discloses a process of treating saline water, including sea water (column 3, lines 12-29), the process includes pretreatment to remove calcium compound by chemical softening, and filtration (column 3, lines 39-50), addition of precipitant, e.g. magnesium hydroxide in an amount of 0.05 to about 7.5 %, to form a precipitate containing calcium, which is further separated by suitable filtration is also disclosed (column 2, lines 28-68, column 4, lines 3-54), and further teaches combination with filtration , e.g. by filter thickness (column 4, lines 55-61); as claimed in steps a) and b), desalination as claimed in step c) and claims 3-4, e.g .using reverse osmosis or evaporation methods (column 5, lines 7-35).

Anderson lack teaching the claimed hydroxide or metal salts or carbonates compounds, and instead uses "magnesium hydroxide". Anderson recognize the use of calcium

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hydroxide and sodium carbonate as conventional calcium precipitants in water treatment, and teaches that those compounds do not sufficiently reduce the concentration of scale forming dissolved salts (column 2, second paragraph)

It would have been obvious to one skilled in this art at the time this invention was made to use calcium hydroxide, sodium carbonate, lime and other precipitating agents for precipitating calcium in sea water, depending on the final level of purity of the final product, the number of pretreatment applied previous to the desalination step, or any further precipitation steps that can further remove salts from the water previous to the final desalination step.

Regarding claim 2, filtering the water prior step a) is also disclosed by Anderson (column 3, lines 29-32).

As to claim 6, recycling part of the brine from the desalination step back to the process is disclosed in Anderson (see column 8, third paragraph).

Regarding claims 7-8, the pH of the water is adjusted to 8.5 in Anderson (column 4, line 10-11), and after the separation of precipitate solids the pH is further adjusted, to a value of 6 (column 8, lines 66-68, and 1-7).

Regarding claim 9, sodium carbonate is disclosed in Anderson (see column 2, lines 18-27). In claim 10, the amount of compound or precipitating agent is discussed above.

The limitation of claim 11 is further disclosed (see column 5, lines 30-33).

4. Claims 15-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson (US 4,036, 749) as applied to claims 1-11 above and further in view of Al-Samadi (US 6,113,797). Anderson, discussed above teaches conventional precipitant

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from calcium and magnesium, e.g. calcium oxide, magnesium hydroxide, etc. The use of sodium hydroxide is not disclosed.

Patent '797 suggests converting hard ions to soft ions that can be removed by membrane filtration, the process add sodium hydroxide to increase the pH to 9 and precipitate calcium and magnesium hydroxide (column 12, last paragraph, and column 13, lines 1-6).

It would have been obvious to one skilled in this art at the time the invention was made to substitute the magnesium Hydroxide in Anderson b sodium hydroxide as suggested in '797 to precipitate calcium or magnesium ions from water, and produce soft ions that do not produce scale in the membrane separation.

Regarding claims 14-22, Anderson teaches multiple precipitation with conventional precipitants (or flocculating agents) for recovery of a predetermined salt or oxide from the process, e.g. calcium oxide, magnesium oxide, calcium sulfate, etc. Adjusting the amount of precipitant or flocculant added to the water or brine is dependent on the concentration of the particular compound in the water or brine, see Anderson (column 4, lines 10-14).

The removal of scale compounds, e.g. calcium and magnesium in more than one stage and with more with suitable precipitant or composition is disclosed in Anderson, calcium oxide, calcium carbonate; sodium carbonate and sodium hydroxide are suggested in '797 to remove calcium, magnesium and silica. Adjusting the amount of this components in successive precipitation stages, as pretreatment of sea water in a

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desalination process it would have been obvious to the skilled artisan based on the teaching discussed by the references above.

5. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsing (US 4,470,150) and Anderson(US 4,036,749). This rejection is discussed in the record, and is maintained. Reference '150 teaches treatment of sea water (see column 7, lines 38-43), the treatment with precipitating agents as claimed, and the filtration are disclosed (see prior action). '150 lack "desalination of the water", which suggested in Anderson ('749). One skilled in this art at the time the invention was made wishing to obtain desalinated water from the filtered water in '150, would have been motivated to use the desalination process, e.g. reverse osmosis or evaporation suggested in '749).

Response to Arguments

3. Applicant's arguments filed 12/12/05 have been fully considered but they are not persuasive. Applicant has amended the claims to limit the water to sea water, which is disclosed in references to Anderson and Hsiung et al. discussed in the record. The precipitant compound is also limited in the claims as amended. A rejection to the claims based on treatment of sea water is discussed above. Reference to All-Samadi ('797) is not directed to sea water, however, the precipitant compound is not limited to precipitate in a particular concentrate or dilute water, but to precipitation of the compound desired in a water medium, one skilled in the art at the time the invention was made can expect certain degree of precipitation of calcium in presence of sodium hydroxide or sodium carbonate in sea water, at pH level of 9. The amount of the compound (hydroxide) added to reach the desired reaction conditions is determined based on the water

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composition, the sodium hydroxide levels can be determined by the level of OH⁻ groups (based on the amount of magnesium hydroxide) suggested in Anderson, and discussed in the office action above.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US patent 3,740,330 is cited as incorporated in Anderson and teaches calcium precipitation from water by lime treatment (calcium oxide, calcium carbonate). 4,462,713 teaches separation of magnesium and calcium compounds from a source of water containing this compounds, the process remove the salts in different steps and produce fresh water from the final filtrate by reverse osmosis, which is further use, the concentrate is recycled to the process. Patents 5,625,825, and 2,796,395 also teach separation of calcium from sea water by addition of sodium or calcium hydroxide, filtration and production of demineralized water (see '825).

3,128,248 teach the use of calcium hydroxide, sodium carbonate, and sodium hydroxide to convert magnesium to magnesium hydroxide in sea water.

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ana M. Fortuna whose telephone number is (571) 272-1141. The examiner can normally be reached on 9:30-6:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L. Walker can be reached on (571) 272-1151. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ana M Fortuna
Primary Examiner
Art Unit 1723

AF
August 4, 2006